



US009636401B2

(12) **United States Patent**
Kaplan

(10) **Patent No.:** **US 9,636,401 B2**

(45) **Date of Patent:** ***May 2, 2017**

(54) **FLEXIBLE AND/OR ELASTIC
BRACHYTHERAPY SEED OR STRAND**

(71) Applicant: **Microspherix LLC**, Boca Raton, FL
(US)

(72) Inventor: **Edward J. Kaplan**, Boca Raton, FL
(US)

(73) Assignee: **Microspherix LLC**, Boca Raton, FL
(US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 84 days.

This patent is subject to a terminal dis-
claimer.

(21) Appl. No.: **14/473,159**

(22) Filed: **Aug. 29, 2014**

(65) **Prior Publication Data**

US 2015/0010470 A1 Jan. 8, 2015

Related U.S. Application Data

(63) Continuation of application No. 13/916,916, filed on
Jun. 13, 2013, now Pat. No. 8,821,835, which is a
continuation of application No. 12/823,700, filed on
Jun. 25, 2010, now Pat. No. 8,470,294, which is a
continuation of application No. 10/665,793, filed on
Sep. 19, 2003, now Pat. No. 7,776,310, which is a
continuation-in-part of application No. 09/861,326,
filed on May 18, 2001, now Pat. No. 6,746,661, said
application No. 10/665,793 is a continuation-in-part
of application No. 09/861,196, filed on May 18, 2001,
now Pat. No. 6,514,193.

(60) Provisional application No. 60/412,050, filed on Sep.
19, 2002, provisional application No. 60/249,128,
filed on Nov. 16, 2000.

(51) **Int. Cl.**

A61K 49/04 (2006.01)

A61K 41/00 (2006.01)

A61K 47/48 (2006.01)

A61K 51/12 (2006.01)

A61N 5/10 (2006.01)

A61K 49/00 (2006.01)

A61B 5/06 (2006.01)

A61L 31/14 (2006.01)

A61L 31/10 (2006.01)

A61L 31/16 (2006.01)

A61L 31/18 (2006.01)

A61B 90/00 (2016.01)

(52) **U.S. Cl.**

CPC **A61K 41/0038** (2013.01); **A61B 5/064**

(2013.01); **A61B 90/39** (2016.02); **A61K**

47/48992 (2013.01); **A61K 49/00** (2013.01);

A61K 49/0409 (2013.01); **A61K 51/1282**

(2013.01); **A61L 31/10** (2013.01); **A61L**

31/146 (2013.01); **A61L 31/148** (2013.01);

A61L 31/16 (2013.01); **A61L 31/18** (2013.01);

A61N 5/1007 (2013.01); **A61N 5/1027**

(2013.01); **A61B 2090/3966** (2016.02); **A61L**

2300/44 (2013.01); **A61N 2005/1023**

(2013.01); **A61N 2005/1024** (2013.01)

(58) **Field of Classification Search**

CPC **A61K 49/00**; **A61K 49/08**; **A61K 51/00**;

A61K 51/12

USPC **424/1.11**, **1.25**, **1.29**, **9.4**; **623/1.1**, **1.34**,

623/1.38

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,578,945	A	3/1926	Withers
2,067,589	A	1/1937	Antrim
2,153,889	A	4/1939	William
2,269,963	A	1/1942	Wappler
2,575,138	A	11/1951	Slaughter
2,668,162	A	2/1954	Lowe
2,703,316	A	3/1955	Schneider
2,758,987	A	8/1956	Salzberg
3,187,752	A	6/1965	Arthur
3,297,033	A	1/1967	Emil et al.
3,351,049	A	11/1967	Lawrence
3,565,869	A	2/1971	DeProspero
3,625,214	A	12/1971	Higuchi
3,636,956	A	1/1972	Schneider
3,752,630	A	8/1973	Schneider

(Continued)

FOREIGN PATENT DOCUMENTS

EP	0030822	9/1983
EP	0292630	11/1988

(Continued)

OTHER PUBLICATIONS

Ackerman, The pathology of radiation effect of normal and neo-
plastic tissue, Am. J. Roentgenol. Radium Ther. Nucl. Med.,
114(3):447-59 (1972).

Alonso, et al., "Biodegradable microspheres as controlled-release
tetanus toxoid delivery systems," Vaccine 12: 299 (1994).

Amersham Health; OncoSeed (Iodine-125 Seeds) <http://www.amershamhealth-us.com/oncoseed/>; printed Nov. 19, 2003.

Amersham Health; "EchoSeed" ; <http://www.amershamhealth-us.com/echoseed/> printed Nov. 19, 2003.

Amersham Health; "Rapid Strand Indications" [Http://www.amershamhealth-us.com/products/index.htm?a=i&i=38](http://www.amershamhealth-us.com/products/index.htm?a=i&i=38) printed Nov. 19, 2003.

(Continued)

Primary Examiner — Michael G Hartley

Assistant Examiner — Jagadishwar Samala

(74) Attorney, Agent, or Firm — Pabst Patent Group LLP;
Yvonne Y. Shyntum

(57) **ABSTRACT**

A flexible or elastic brachytherapy strand that includes an
imaging marker and/or a therapeutic, diagnostic or prophyl-
actic agent such as a drug in a biocompatible carrier that can
be delivered to a subject upon implantation into the subject
through the bore of a brachytherapy implantation needle has
been developed. Strands can be formed as chains or con-
tinuous arrays of seeds up to 50 centimeters or more, with
or without spacer material, flaccid, rigid, or flexible.

25 Claims, 6 Drawing Sheets